Meridian 1

Intelligent peripheral equipment circuit cards for Spain

Option 11 - Description and Installation

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About this document

This document is a Supplement to the Option 11 *Installation guide* 553-3011-210. It describes the functions and applications of the following circuit cards that are available for use in Spain:

- NT5K99AA Central Office trunk card with PPM
- NT5K99BA Central Office trunk card without PPM
- NT5K83AA E&M tie trunk card
- NT5K02SA Flexible analog line card with low voltage message waiting
- NT5K96SA Flexible analog line card without message waiting.

The above cards were introduced as part of the Phase 7C software program. They will go up one vintage with the introduction of Phase 8B software.

Central Office trunk circuit cards

Functional description

The NT5K99AA and NT5K99BA Central Office trunk cards provide the interface between the Option 11 system and up to eight analog Central Office (CO) trunks. They can be installed in slot 1 to 10 in the main cabinet, ans well as any slot in the expansion cabinet.

The NT5K99AA and NT5K99BA Central Office cards are exactly the same except for the periodic pulse metering (PPM) feature: the NT5K99AA card supports internal 12 kHz PPM but the NT5K99BA card does not.

Common features

The NT5K99AA and NT5K99BA Central Office trunk cards:

- are equipped with eight trunk units
- allow trunk type to be configured on a per unit basis
- allow individual units or the entire board to be disabled by software
- supports A-law companding
- indicate self-test status during an automatic or manual self-test
- provide card-identification for auto configuration, and for determining the serial number and firmware level of the card
- convert transmission signals from analog-to-digital and from digital-to-analog
- provide 2 dB transmission pads for operation over long or short lines

- provide termination and transhybrid balance impedance to match the Spanish complex impedance network
- provide direct reporting of Periodic Pulse Metering (PPM) pulses to software in either buffered or unbuffered format.
- provide detection and reporting of battery reversals from the Central Office.

Physical description

Switch settings

There are no option switches on the NT5K99AA and NT5K99BA Central Office trunk cards. All settings are configured in software.

Hardware installation

The NT5K99AA and NT5K99BA Central Office trunk cards have eight units. Each unit connects to the shelf backplane through an 80-pin connector. The backplane is cabled to the input/output (I/O) panel which is then cabled to the cross-connect terminal.

At the cross-connect terminal, each unit connects to external apparatus by Tip and Ring leads.

Cross connections

Table 1 provide cross connect information for the NT5K99AA and NT5K99BA Central Office trunk cards.

Table 1
NT5K99 Central Office Trunk connections

Lead	Pins	Pair color	Unit number
T0 R0	26 1	W-BL BL-W	Unit 0
PPM0 —	27 2	W-O O-W	
T1 R1	28 3	W-G G-W	Unit 1
PPM1 —	29 4	W-BR BR-W	
T2 R2	30 5	W-S S-W	Unit 2
PPM2 —	31 6	R-BL BL-R	
T3 R3	32 7	R-O O-R	Unit 3
PPM3 —	33 8	R-G G-R	
T4 R4	34 9	R-BR BR-R	Unit 4
PPM4 —	35 10	R-S S-R	
T5 R5	36 11	BK-BL BL-BK	Unit 5
PPM5 —	37 12	BK-O O-BK	
T6 R6	38 13	BK-G G-BK	Unit 6
PPM6 —	39 14	BK-BR BR-BK	
T7 R7	40 15	BK-S S-BK	Unit 7
PPM7 —	41 16	Y-BL BL-Y	

Trunk configuration

Route Data Block

Each trunk unit on the NT5K99AA and NT5K99BA Central Office trunk cards is attached to a route with an associated route data block. Periodic Pulse Metering (PPM) and trunk timers are configured on a route basis. The route data block is programmed in overlay 16.

Note: All prompts are defaulted except for those noted in Table 2. Default values are shown in brackets.

Table 2
LD 16 Route Data Block

Prompt	Response	Comments
REQ	NEW	
TYPE	RDB	Define a new Route Data Block
CUST	0-99	Enter customer number
ROUT	0-127	Enter route number
TKTP	COT	Define trunk type as Central Office
ICOG	IAO	Incoming and Outgoing trunk
CNTL	YES	Change a trunk timer
TIMER	ICF 128	Incoming Flash Timer = 128 ms
	OGF 896	Outgoing Flash Timer = 896 ms
	EOD 3072	End of Dial Timer (Digipulse) = 3072 ms
	DSI 4992	Disconnect Supervision Timer = 4992 ms
	NRD 4992	No Ringing Detector Change Timer = 4992 ms
	ODT 896	End of Dial Timer (Digitone) = 896 ms
	RGV 768	Ring Validation Timer = 768 ms
	GTO 4096	Guard Timer Outgoing = 4096 ms
	GTI 896	Guard Timer Incoming = 896 ms
CDR	YES	Call Detail Recording allowed

Note: Reference overlay 97 to set up DTMF dialling parameters.
REQCHG
TYPEXCTP
DTMF89

Trunk Data Block

Use overlay 14 to configure each of the trunk units on the NT5K99AA and NT5K99BA Central Office trunk cards. Default values are shown in brackets.

Note: All prompts are defaulted except for those noted in Table 3. Default values are shown in brackets.

Table 3
LD 14 Trunk Data Block

Prompt	Response	Comments
REQ	NEW	Define a new trunk unit
TYPE	COT	Central Office Trunk
TN	CC UU	Terminal number of the unit in Option 11 format: Card number, Unit number
XTRK (see note)	XCOT	Type is IPE COT
CDEN	(8D)	Card density is 8D (default)
SIGL	LOP	Loop Start signalling
PPID (see note)	04 or <cr>	PPM ID is 04 for Spain; skip if PPM is not to be configured
CLS	SHL, (LOL) DTN, (DIP) BAT, (XBAT)	Attenuation Pads In, (Out) Digitone signalling, (Digipulse) Battery supervision enabled, (disabled)

Note: This prompt is required only for the first unit defined on each NT5K99AA or NT5K99BA card.

Self-test

When the NT5K99AA and NT5K99BA trunk cards are installed and power is applied to them, a self-test is performed on each card. The red LED on the faceplate flashes three times, then remains continuously lit until the card is enabled in software. If the self-test fails, the LED will remain lit.

Technical description

Power requirements

Table 4 shows the power requirements for the NT5K99AA and NT5K99BA Central Office trunk cards.

Table 4
NT5K99 circuit card power requirements

Voltage	Idle current	Active current
+15.0 V dc (see note 1)	170 mA	255 mA
-15.0V dc (see note 1)	170 mA	255 mA
+ 8.5 V dc (see note 2)	90 mA	90 mA
+ 5.0 V dc	110 mA	250 mA

Note 1: Analog circuitry is powered with +/- 12V generated from +/- 15V. The maximum current imbalance between the +/- 15V rails is 100 mA per circuit pack.

Note 2: 8.5V is regulated to give 5V.

Environmental specifications

Table 5 shows the environmental specifications of the NT5K99AA and NT5K99BA Central Office trunk cards.

Table 5
NT5K99 circuit card environmental specifications

Parameter	Specifications
Operating temperature:	
Normal	0 to 40 degrees C
Short term	0 to 50 degress C
Operating humidity:	
Normal	10 to 95 % Relative Humidity
Short term	5 to 95 % Relative Humidity
Storage temperature	- 45 to + 70 degrees C
Storage humidity	0 to 95% Relative Humidity

Pad switching

Software configuration allows the selection of 2dB short line loss pads on a per unit basis. The pad out condition is the default condition.

Table 6
NT5K99AA and NT5K99BA Pad switching

Direction	Pad In	Pad out
Analog-to-Digital loss	-0.3 dB, +0.7 dB	-0.3 dB, +0.7 dB
Digital-to-Analog loss	-0.3 dB, +0.7 dB	-0.3 dB, +0.7 dB

Trunk types description

Each NT5K99AA and NT5K99BA Central Office trunk cards support:

- Loop start operation
- Battery reversal detection

In addition, the NT5K99AA Central Office trunk card supports periodic pulse metering.

Loop start operation

Loop start operation is configured in software and is implemented in the card through software download messages. Figure 1 shows loop start operation for the NT5K99AA Central Office trunk card; Figure 2 shows loop start operation for the NT5K99BA Central Office trunk card.

Figure 1
NT5K99AA loop start operation

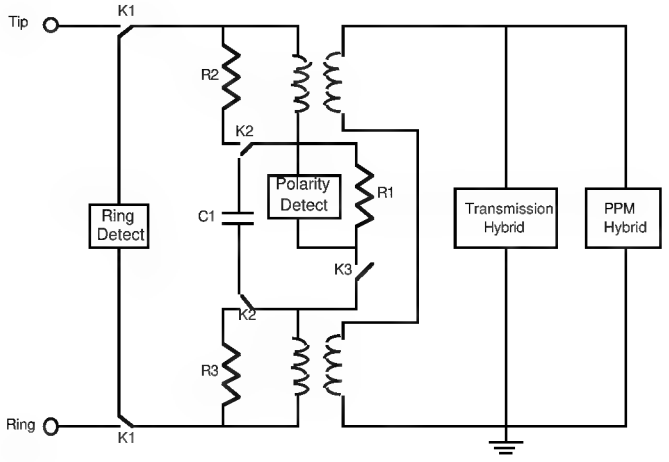
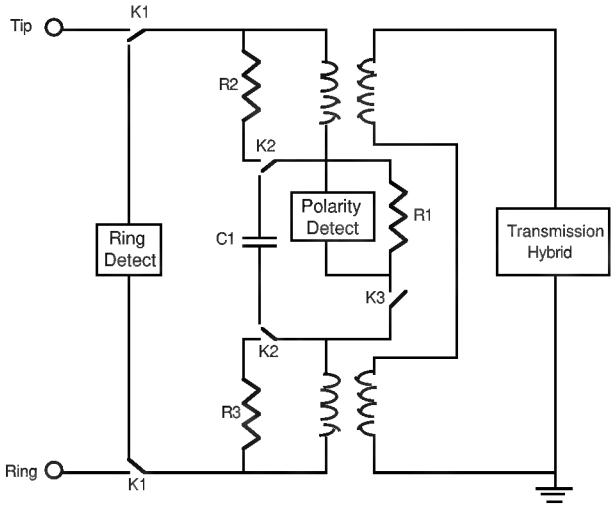


Figure 2
NT5K99BA loop start operation



Idle state

In the idle state, the ringing detector is connected across the tip and ring leads, presenting a high impedance loop to the Central Office.

Call placed by Central Office

The Central Office initiates a call by applying ringing between the tip and ring leads. The Central Office trunk card sends a seize message to software. K1 and K3 (see Figures above) change over and a low resistance DC loop is placed between the tip and ring leads.

Call placed by Option 11

To initiate a call, the Meridian 1 activates K1, which switches out the ringing detector and places a low resistance loop across the tip and ring leads. The Meridian 1 sends digits in the form of Dual Tone Multifrequency (DTMF) tones or pulse digits. Relay K3 controls the dc path and provides decadic outpulsing by opening and closing.

Central Office disconnect

The method used by the Central Office to disconnect a call depends on the direction of the call:

- on an incoming call, the Central Office disconnects a call by reversing battery.
- on an outgoing call, the Central Office disconnects a call by reversing battery twice. (Battery supervision must be configured in LD 14 in order to detect the battery reversals).

In the description above, what is the point of reference for "incoming" and "outgoing" calls? (i.e. incoming to the CO or to the Meridian 1?)

Option 11 disconnect

The method used by the Option 11 to disconnect a call depends on the Central Office trunk card being used:

- for NT5K99AA trunk cards: the Meridian 1 opens relay K3 and breaks the dc loop. Relay K1 remains in the loop state and capacitor C1 remains in circuit, thereby presenting a low impedance ac path for PPM pulses. After approximately 4 seconds, relay K1 times out and breaks the ac path. The ringing detector is reconnected across the tip and ring leads.
- for NT5K99BA trunk cards: the Option 11 opens relay K2 and breaks the dc loop. At the same time, relay K1 opens, breaking the ac loop. The ringing detector is reconnected across the tip and ring leads.

Features description

Periodic Pulse Metering (PPM)

All trunk units on the NT5K99AA Central Office trunk card can be individually configured to support the Periodic Pulse Metering (PPM) feature.

Periodic Pulse Metering allows the user of a telephone on a Option 11 to keep an accurate record of Central Office calls for billing or administration purposes.

For more information on PPM, refer to *Generic X11 Including Supplementary Features appendix 2 to 553-2311-105.*

E&M tie trunk circuit card

Functional description

The NT5K83AA E&M Tie trunk card provides the interface between the Option 11 system and up to four analog trunks. It can be installed in slots 1 to 10 in the main cabinet and in any slot in the expansion cabinet.

The NT5K83AA E&M Tie trunk card supports four analog trunks. Each trunk circuit can be individually configured as:

- 4-wire E&M Type 1 and 2
- Recorded Announcement trunk (RAN)
- Music trunk (MUS)
- Paging trunk (PAG)

Common features

The NT5K83AA E&M Tie trunk card:

- is equipped with four trunk units
- converts transmission signals from analog-to-digital and from digital-to-analog
- provides software selectable A-law or μ-law operation
- enables and disables individual units or the entire card under software control
- provides outpulsing on the card. Make break ratios are defined in software and downloaded during power up and by software commands.

- provides indication of card status from self-test diagnostics on the LED
- allows trunk type to be configured on a per unit basis in software
- provides termination against 600 ohms for 4-wire E&M trunk circuits
- provides flexible transmission for various loss plans
- provides paging (PAG), recorded announcement (RAN), and Music (MUS) interfaces.

Physical description

Switch settings

There are no option switches on the NT5K83AA E&M Tie trunk card. All settings are configured in software.

Connections

The NT5K83AA E&M Tie trunk card has four units. Each unit connects to the shelf backplane through an 80-pin connector. The backplane is cabled to the input/output (I/O) panel which is then cabled to the cross-connect terminal.

At the cross-connect terminal, each unit connects to external apparatus by tip and ring leads.

Hardware installation

Tables 1 to 3 provide cross connect information for the NT5K83AA E&M Tie trunk card.

Table 7
NT5K83 E&M 2-Wire Paging trunk connections

Lead designations	Pins	Pair color	Unit number
T0 R0	27 2	W-O O-W	Unit 0
A PG	29 4	W-BR BR-W	
T1 R1	31 6	R-BL BL-R	Unit 1
A PG	33 8	R-G G-R	
T2 R2	35 10	R-S S-R	Unit 2
A PG	37 12	BK-O O-BK	
T3 R3	39 14	BK-BR BR-BK	Unit 3
A PG	41 16	Y-BL BL-Y	

Table 8
NT5K83 E&M 2-wire Recorded Announcement trunk connections

Lead designations	Pins	Pair color	Unit number
T0 R0	26 1	W-BL BL-W	Unit 0
SIG B SIG A	29 4	W-BR BR-W	
T1 R1	30 5	W-S S-W	Unit 1
SIG B SIG A	33 8	R-G G-R	
T2 R2	34 9	R-BR BR-R	Unit 2
SIG B SIG A	37 12	BK-O O-BK	
T3 R3	38 13	BK-G G-BK	Unit 3
SIG B SIG A	41 16	Y-BL BL-Y	

Table 9
NT5K83 E&M 4-Wire Type C2 connections

Lead designations	Pins	Pair color	Unit number
RA RB	26 1	W-BL BL-W	Unit 0
TA TB	27 2	W-O O-W	
E M	28 3	W-G G-W	
RA RB	30 5	W-S S-W	Unit 1
TA TB	31 6	R-BL BL-R	
E M	32 7	R-O O-R	
RA RB	34 9	R-BR BR-R	Unit 2
TA TB	35 10	R-S S-R	
E M	36 11	BK-BL BL-BK	
RA RB	38 13	BK-G G-BK	Unit 3
TA TB	39 14	BK-BR BR-BK	
E M	40 15	BK-S S-BK	
Note: The cable pair designated TA, TB is the transmit pair. The pair designated RA, RB is the receive pair.			

Trunk configuration

Route Data Block

Each trunk unit on the NT5K83AA E&M trunk card is attached to a route with an associated route data block. The route data block is programmed in overlay 16.

Note: All prompts are defaulted except for those noted in Table 4. Default values are shown in brackets.

Table 10
LD 16 Route Data Block

Prompt	Response	Comments
REQ	NEW	
TYPE	RDB	Define a new Route Data Block
CUST	0-99	Enter customer number
ROUT	0-127	Enter route number
TKTP	TIE, RAN, PAG, MUS	Define trunk type as Tie, (Recorded Announcement), (Paging) or (Music)
ICOG	ICT, OGT, IAO	Incoming, Outgoing, Both
ACOD	XX	XX=Trunk route access code

Trunk Data Block

Use overlay 14 to configure each of the trunk units on the NT5K83AA E&M trunk card. Default values are shown in brackets.

Table 11
LD 14 Trunk Data Block

Prompt	Response	Comments
REQ	NEW	Define a new trunk unit
TYPE	TIE, RAN, PAG, MUS	Define trunk type as Tie, Recorded Announcement, Paging or Music
TN	CC UU	Terminal number of the unit in Option 11 format Card, Unit
XTRK (see note)	XFEM	Type is IPE XFEM
SIGL	EM4	4 wire E&M speech
EMTY	TY1, (TY2)	Type 1 signaling, (Type 2)
STRI	IMM, WNK, DDL	Incoming start Immediate, (Wink), (Delayed dial)
STRO	IMM, WNK, DDL	Outgoing start immediate, (Wink), (Delayed Dial)
SUPN	YES, (NO)	Answer and disconnect supervision
CLS	TRC, (NTC)	Attenuation pads in, (out)

Note: This prompt is required only for the first unit defined on each NT5K83AA card.

Self-test

When the NT5K83AA E&M Tie trunk card is installed and power is applied to it, a self-test is performed on the card. The red LED on the NT5K83AA faceplate flashes three times, then remains continuously lit until the card is enabled in software. If the self-test fails, the LED will remain lit after the card is enabled.

Technical description

Power requirements

Table 6 lists the power requirements for the NT5K83AA trunk card.

Table 12
NT5K83AA Power requirements

Voltage	Active Current
+/- 15.0 V dc	150 mA
- 15 V dc	150 mA
+8.5 V dc	35 mA
+ 5 V dc	110 mA
-48 V dc	80 mA

Environmental specifications

Table 7 provides the environmental specifications for the NT5K83AA E&M Tie trunk card.

Table 13
NT5K83AA Environmental specifications

Parameter	Absolute Limit
Operating temperature	10-45 degrees C, ambient
Operating humidity	20 to 80% RH (non condensing)
Storage temperature	-20 to +60 degrees C

Pad switching

Loss values for the NT5K83AA E&M trunk card are given in Table 8.

Table 14
Loss values for NT5K83AA E&M trunk card

	Analog-to-Digital	Digital-to-Analog
4-wire E&M:		
Pad OUT Pad IN	-3.5 dB -1.5 dB	+3.0 dB +5.0 dB
PAG	not applicable	+5.5 dB
RAN/MUS	-1.0 dB	not applicable

Trunk types description

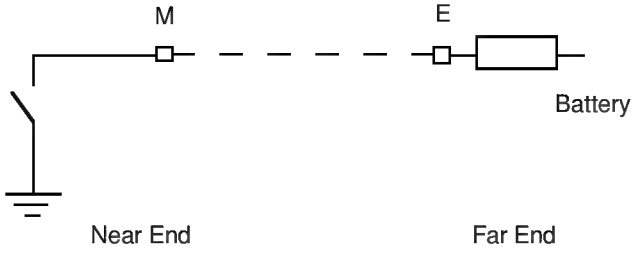
Each unit on the NT5K83AA E&M Tie trunk card supports:

- 4-wire E&M trunk Type V and II
- Recorded Announcement (RAN) trunk
- Paging (PAG) trunk
- Music (MUS) trunk

4-wire E&M Type V (BPO) trunk operation

Type V E&M operation uses two signaling leads, E and M, that are electrically separated from the associated speech circuit. Signals are sent on the M lead and received on the E lead as shown in Figure 1.

Figure 3
E&M Type V signaling



Send signals

All signals are sent in the form of a contact between M and ground or an open circuit between M and ground.

Receive signals

Signals are received on the E lead by detecting the conditions applied to the M lead by the far end.

Idle state

In the Idle state, the E lead receives an "idle signal" from the Far End and is ready to receive calls.

Seize

To place an outgoing call, the Meridian 1 at the near end sends a seizing signal through the M lead to the far end. The incoming end recognizes the seize signal and prepares to receive digits.

Dialing

Digits are sent through the near end M lead in the form of 10 PPS pulses of the open-circuit condition.

Answer

When the called party answers, the far end sends an "answer" signal through the Far End M lead.

Call disconnect

Either party can disconnect the call by applying a clear signal to the M lead. The far end applies a "clear back" signal, while the near end applies a "clear forward" signal. The circuit remains busy until both clear forward and clear backward signals have been exchanged.

Table 9 provides a summary of NT5K83GA Type V signaling states.

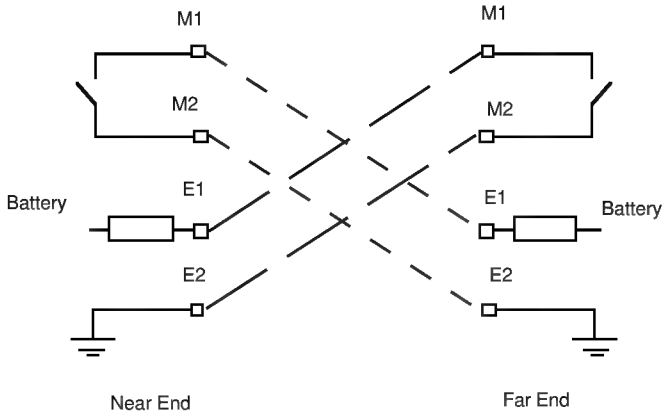
Table 15
Summary of NT5K83GA Type V signaling states

Signal	Outgoing PBX sending condition — M Wire	Incoming PBX sending condition — M Wire
Idle	Earth Off	Earth Off
Seize	Earth On	—
Digit Pulse	Earth Off pulses in step with dial pulses	—
Answer	—	Earth On
Clear forward	Earth Off for longer than 300ms	—
Clear back	—	Earth Off for longer than 300ms

4-wire E&M Type II trunk operation

Type II E&M operation uses two signaling pairs, E and M, that are electrically separated from the associated speech circuit. Signals are sent on the M pair and received on the E pair as shown in Figure 2.

Figure 4
E&M Type II signaling



Send signals

All signals are sent in the form of a contact make or break between the two M leads. In the make state there is a maximum of 200 V√Ω between the two M leads. In the break state there is a minimum of 100 kΩ between the M leads.

Receive signals

Signals are received on the E lead by detecting the contact make or break applied at the far-end on the M leads.

Idle state

In the Idle state the Option 11 applies an "Idle Signal" to the M leads to indicate that it is available to receive calls.

Seize

To place an outgoing call, the Option 11 at the near end sends a seizing signal through the M leads to the far end. The incoming end (far end) recognizes the seize signal, busies the circuit against outgoing calls, and prepares to receive digits.

Dialing

Digits are sent through the near end M leads in the form of 10 pps pulses of the open-circuit condition.

Answer

When the called party answers, the far end sends an "answer" signal through the M leads.

Call disconnect

Either party can disconnect the call by applying a clear signal to the M leads. The far end applies a "clear back" signal, while the near end applies a "clear forward" signal. The circuit remains busy until both clear forward and clear backward signals have been exchanged.

Table 10 provides a summary of NT5K83AA Type II signaling states.

Table 16
Summary of NT5K83AA Type II signaling states

Signal	Outgoing PBX sending condition — M Leads	Incoming PBX sending condition — M Leads
Idle	Contact break	Contact break
Seize	Contact make	—
Digit Pulse	Contact break pulses in step with dial pulses	—
Answer	—	Contact make
Clear forward	Contact break for longer than 300 ms	—
Clear back	—	Contact break for longer than 300 ms

Recorded Announcement/Music trunk operation

When used in the Recorded Announcement/Music mode, the trunk circuit is connected to a customer provided recorded announcement machine or a music source.

Machines supported

The NT5K83AA E&M Tie trunk card supports the following types of announcement machines:

- Start mode announcement machines
- Continuous mode announcement machines.

Recorded announcers supported include the Cook Digital 4-channel announcer and the Audichron HQI-112.

Start mode

In start mode, the E&M Tie trunk card provides a startpulse to the announcement machine to begin playback of the message. The announcement source requires the following:

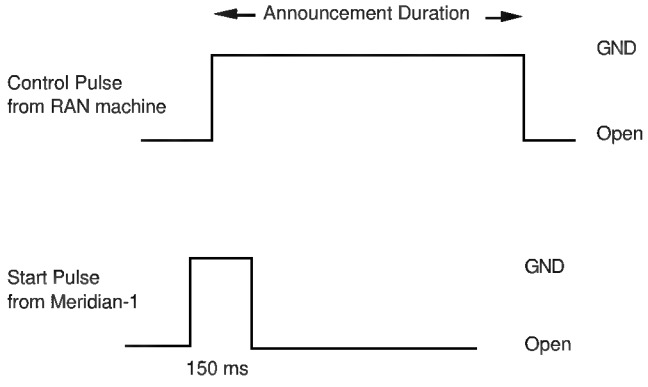
- an impedance of 4 ohms or less
- ground to the trunk unit when playing and an open circuit when idle. This is done through a control lead to the trunk circuit.
- default signal level of -9 dBm (in 600Ω) adjustable to a level of 10 dBm.

To start the announcement, the NT5K83AA E&M Tie trunk card provides a momentary ground signal (150 ms) to the source. The announcement machine should then start playing its message.

The NT5K83AA trunk card expects status information from the announcement machine, that is, whether it is idle or playing. For this reason, the announcement machine requires a control lead to the trunk circuit.

Figure 3 shows recorded announcement in start mode.

Figure 5
Recorded announcement - start mode



Continuous mode

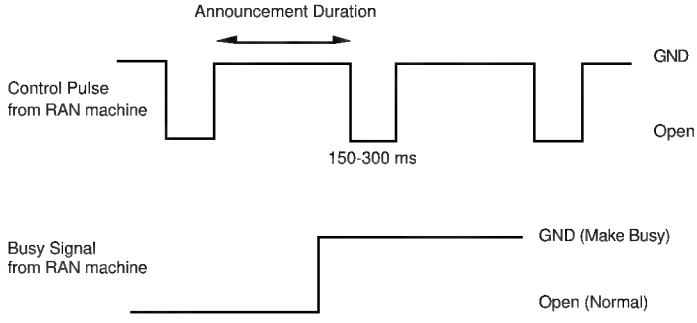
The requirements for continuous mode announcement machines are as follows:

- an impedance of 4 ohms or less
- generation of a control pulse (150 - 300 ms) at the start of the announcement period
- default signal level of -9 dBm (in 600Ω) adjustable to a level of 10 dBm.

The announcement machine may provide a separate busy signal when the machine is recording or erasing a message or if the machine is malfunctioning. The busy signal will be used by the Option 11 for maintenance purposes.

Figure 4 shows recorded announcement in continuous mode.

Figure 6
Recorded announcement - continuous mode



Music source

The music source should provide an impedance of 600 Ω. The default signaling level should be -9 dBm (in 600Ω) adjustable to a level of 10 dBm.

Paging trunk operation

When used in the paging mode, the trunk circuit is connected to a customer-provided paging amplifier system. When accessed, the card provides a loop closure. In a typical application, the loop closure will cut off a music supply and switch the paging trunk transmission path to the paging amplifier.

Flexible analog line circuit cards

Functional description

The NT5K02SA and NT5K96SA Flexible analog line cards provide an interface for up to 16 analog (500/2500-type) telephones lines. They can be installed in slots 1 to 10 in the main cabinet and in any slot in the expansion cabinet.

The NT5K02 and NT5K96 circuit cards are exacly the same except for the message waiting feature: the NT5K02 card has a flashing low volage message waiting signal, but the NT5K96 does not.

Common features

Both Flexible Analog line cards provide the following features:

- analog to digital and digital to analog conversion for 16 analog telephone lines
- software selectable A-Law or μ-Law companding
- card-identification for auto configuration
- software downloadable loss plan
- on hook/off hook detection
- connection for an ac ringing signal
- automatic disconnection when the telephone set goes off hook
- ground button detection
- direct reporting of digits dialed (500 sets) by collecting dial pulses (10 and 20 pulses per second)

- limited line current to telephone sets on short loops and under fault conditions. Otherwise, loop current varies to allow automatic gain compensation according to loop length.
- flashing low voltage 1 Hz message waiting signal. (NT5K02SA card only).

Physical description

Switch settings

There are no option switches on the Flexible Analog line card. All settings are configured in software.

Connections

The Flexible Analog line card has 16 units. Each unit connects to the shelf backplane through an 80-pin connector. The backplane is cabled to the input/output (I/O) panel which is then cabled to the cross-connect terminal. At the cross-connect terminal, each unit connects to external apparatus by tip and ring leads.

Faceplate LED

The faceplates of the NT5K02 and NT5K96 are equipped with a red LED which lights when all the assigned units on the circuit cards are disabled.

Technical description

Power requirements

Table 1 lists the power requirements for the NT5K02 and NT5K96 Flexible Analog line cards.

Table 17
NT5K02SA and NT5K96SA line card power requirements

Voltage	Idle current	Active current
+15.0 V dc	120 mA	120 mA
-15.0 V dc	48 mA	48 mA
+ 8.5 V dc	250 mA	280 mA
-48.0 V	60 mA	700 mA
- 48.0 V dc	0 mA	320 mA
-120.0 V dc	0 mA	32 mA
Ring V ac	0 mA	160 mA (Note)

Note: Reflects 10 mA for ringing one telephone per unit. There may be up to five telephone ringers on a unit.

Environmental specifications

Table 2 lists the environmental specifications of the Flexible Analog line cards.

Different values for Meridian 1 and Option 11.

Table 18
NT5K02SA and NT5K96SA environmental specifications

Parameter	Specifications
Operating temperature	0 to 50 degrees C
Operating humidity	10 to 95 % Relative Humidity

Signalling

Loop operation

The Flexible Analog Line Card is loop start, with a loop limit of 1300 Ω including the telephone set. The minimum and maximum values of current feed are 45 mA to 75 mA respectively.

Table 3 lists the number of telephone sets that can be supported by the loop.

Table 19
Loop limits

Loop resistance including telephone sets	Number of telephone sets
350 Ω or less	2
Over 350 Ω to a maximum of 1300 Ω	1

Ringers

A maximum of 5 NE-C4A ringers can be supported on one unit. Ringing is supplied to the telephones at a frequency of 25 Hz at a voltage of 75 Vrms, with cadence in the range of 1500 to 3000 ms.

Table 4 shows the number of ringers supported for various loop lengths.

Table 20
Ringers supported on each unit of the NT5K02SA and NT5K96SA card

Number of Ringers	1	2	3	4	5
Loop Length (Ω)	1000	1000	850	600	350

Message waiting indicator

The message waiting indicator consists of a LED flashing at a rate of 1 Hz at the telephone set. (A continuously lit LED as a message indicator is not provided.) The LED is activated as a result of a reversal of the Tip and Ring leads.

Ground button detection

The ground button detector sends a recall signal 50 ms after the application of a ground on either the Tip or Ring of the line. The ground must be applied for a time greater than the minimum hookflash time. The loop resistance to the ground signal can be between 0 and 500 Ω.

Hookflash special features

Pressing the hookflash for a specified length of time is seen by the NT5K02SA and NT5K96SA cards as a request for special services. To access special features, the hookflash must be pressed for at least 130 milliseconds (for DTMF sets), but no longer than 1000 milliseconds (for dedadic sets).

Flash time configuration

Falsh times are configured in Overlay 97. The flash timers may be configured with one of two sets of values, as oulined in Table 3.

Note: All prompts are defaulted except for those noted in Table 5. Default values are shown in brackets.

Table 21
LD 97 Flash Timer Configuration

Prompt	Response	Comments
REQ	CHG	
TYPE	SYSP	
INTN	YES	System is A-law
•		
FLSH	45140	For sets with a flashhook button
	451050	For sets without a flashhook button
		Note: This is a system wide parameter, and may not be changed for individual sets.

Meridian 1

Intelligent peripheral equipment circuit cards for Spain

Option 11 - Description and Installation

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